

Scheduling crew reserve duties with flexible time windows

The crew reserve duty scheduling problem involves generating reserve duties months in advance.

These duties are daily periods where crew members are on call at their operational bases, ready to perform jobs assigned to them by dispatchers, that are handling disruptions typically during the day of operation.

This optimisation problem is challenging because the exact time and place where a reserve duty is needed is unpredictable and can vary throughout the year.

We address a new variant of this problem where reserve duties have a flexible time window that will be fixed closer to the day of operation.

The fixed duties can be different for different days according to what is more likely to be the reserve needs on those days.

In order to solve this problem we propose several alternative approaches combining in different ways greedy heuristics, integer linear programming, stochastic simulation and possibly other methods. We compare their performance based on evaluation tests performed with data from a major Northern European passenger railway operator. We also compare scenarios with flexible time windows against those with rigid ones.

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